DRINKING WATER SURVEILLANCE PROGRAM

BELLE RIVER WATER TREATMENT PLANT

ANNUAL REPORT 1990

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BELLE RIVER
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

BELLE RIVER WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Belle River water treatment plant is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, taste and odour control and disinfection. This plant has a design capacity of 18.0 x 1000 m^3/day. The Belle River water treatment plant serves a population of approximately 13,000.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Belle River water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE

A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE
BACTERIOLOGICAL	24	18	75	8	1	12	6	0	0
CHEMISTRY (FLD)	24	24	100	48	48	100	63	63	100
CHEMISTRY (LAB)	176	159	90	175	125	71	208	171	82
METALS	192	84	43	192	51	26	230	79	34
CHLOROAROMATICS	112	0	0	112	0	0	70	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	119	0	0	119	0	0	.	.	.
PESTICIDES & PCB	273	2	0	273	2	0	106	0	0
PHENOLICS	8	0	0	8	1	12	.	.	.
SPECIFIC PESTICIDES	60	0	0	60	0	0	5	0	0
VOLATILES	232	0	0	232	32	13	174	24	13
TOTAL	1232	287		1239	260		862	337	

DRINKING WATER SURVEILLANCE PROGRAM

BELLE RIVER WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Belle River water treatment plant in May of 1990. This is the first DWSP annual report for this plant.

PLANT DESCRIPTION

The Belle River water treatment plant is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, taste and odour control and disinfection. This plant has a designed capacity of 18.0 x 1000 m^3/day. The Belle River water treatment plant serves a population of approximately 13,000.

The sample day flows ranged from 4.8 x 1000 m^3/day to 13.0 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow

sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of

the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 8 of 14 treated and distributed water samples with a maximum reported value of 23.0°C.

CHEMISTRY (LAB)

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in 2 of 14 treated and distributed water samples with a maximum reported value of 462.0 umho/cm.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 14 of 14 treated and distributed water samples with a maximum reported value of 189.6 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 4 of 13 treated and distributed water samples with a maximum reported value of 230.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

Atrazine was found at positive levels in 2 of the 8 treated water samples analyzed. The maximum observed level was 1,600.0 ng/L. This was below the ODWO Interim Maximum Acceptable Concentration of 60,000 ng/L.

No other pesticides were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 14 treated and distributed water samples analyzed with a maximum level of 75.5 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Belle River water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

BELLE RIVER WATER TREATMENT PLANT

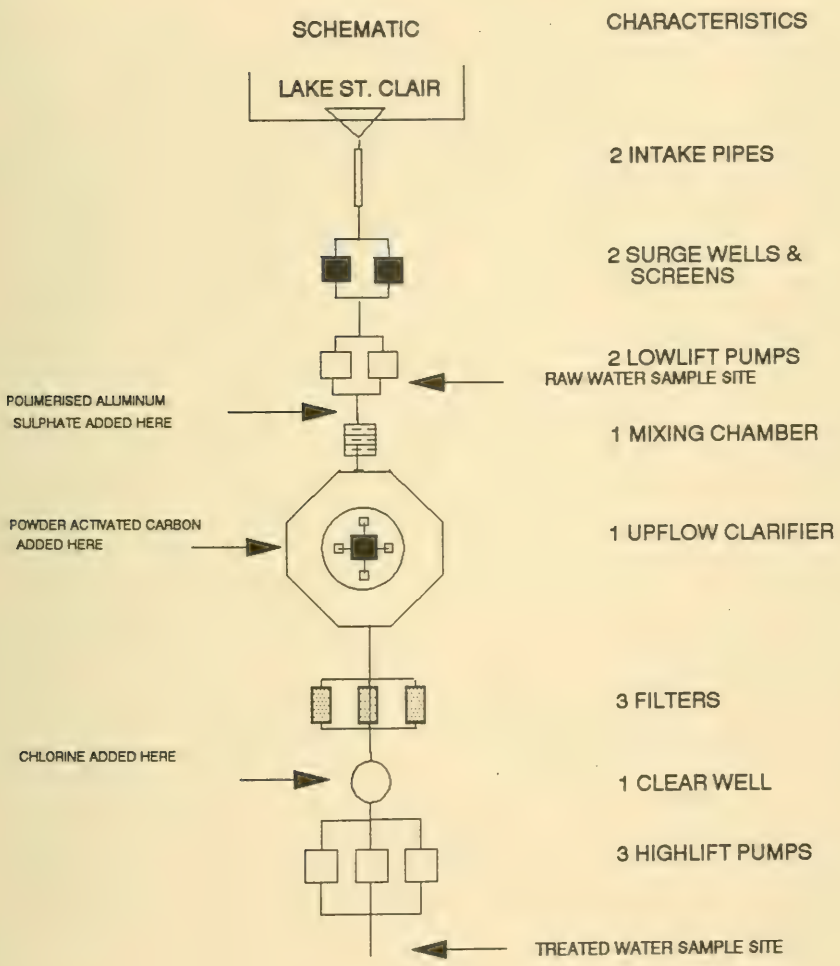

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003412
PLANT NAME: BELLE RIVER WTP

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER :J. DRUMMOND

UTM #: 173592504684575

PLANT SUPERINTENDENT: ED RENAUD

ADDRESS: 497 LAKEVIEW DRIVE
BELLE RIVER,ONTARIO
NOR 1AO
(519 728-1680)

MUNICIPALITY: BELLE RIVER
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	.000	(X 1000 M3)
DESIGN CAPACITY:	18.000	(X 1000 M3/DAY)
RATED CAPACITY:	.000	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
BELLE RIVER	3,600
TWP OF MAIDSTONE	3,420
TWP OF ROCHESTER	5,980

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	AFTER FILTERS	FOUR TIMES/DAY
	HIGHLIFT DISCHARGE	FOUR TIMES/DAY
PH	HIGHLIFT DISCHARGE	DAILY READING
	RAW WATER	DAILY
TEMPERATURE	HIGHLIFT DISCHARGE	DAILY READING
	RAW WATER	DAILY READING
TURBIDITY	RAW WATER	DAILY READING

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)			
			COAGULATION	COAGULATION AID	POST CHLORINATION	TASTE & ODOUR
			POLYMERIZED ALUMINUM	POLYELECTROLYTE	CHLORINE	ACTIVATED CARBON POWDER
DATE	DELAY * TIME(HRS)	FLOW (1000M3)				
MAY 24	.50	5.640	39.00	2.00	2.10	
JUN 19	.00	13.000	39.00	2.00	2.17	
JUL 17	.30	7.270	22.50	2.00	3.88	
AUG 20	.00	5.240	26.60	3.04	1.90	4.49
SEP 18	.00	5.820	48.00	3.04	2.26	7.83
OCT 15	.00	5.950	23.40	3.16	2.44	3.32
NOV 20	.00	4.850	43.20	3.72	2.24	
DEC 18	.00	5.100	41.10	3.74	2.84	

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	8	6	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	8	1	0	6	0	0
TOTAL COLIFORM MF	8	4	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	8	8	0	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	24	18	0	8	1	0	6	0	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	8	8	0	11	11	0
FLD CHLORINE FREE	.	.	.	8	8	0	11	11	0
FLD CHLORINE (TOTAL)	.	.	.	8	8	0	11	11	0
FLD PH	8	8	0	8	8	0	11	11	0
FLD TEMPERATURE	8	8	0	8	8	0	11	11	0
FLD TURBIDITY	8	8	0	8	8	0	8	8	0
*TOTAL SCAN CHEMISTRY (FLD)	24	24	0	48	48	0	63	63	0
CHEMISTRY (LAB)									
ALKALINITY	8	8	0	8	8	0	11	11	0
CALCIUM	8	8	0	8	8	0	11	11	0
CYANIDE	8	0	0	8	0	0	.	.	.
CHLORIDE	8	8	0	8	8	0	11	11	0
COLOUR	8	6	2	8	0	7	11	0	10
CONDUCTIVITY	8	8	0	8	8	0	11	11	0
DISS ORG CARBON	8	8	0	8	8	0	11	11	0
FLUORIDE	8	8	0	8	8	0	11	11	0
HARDNESS	8	8	0	8	8	0	11	11	0
IONCAL	8	8	0	8	8	0	11	11	0
LANGELIERS INDEX	8	8	0	7	7	0	10	10	0
MAGNESIUM	8	8	0	8	8	0	11	11	0
SODIUM	8	8	0	8	8	0	11	11	0
AMMONIUM TOTAL	8	3	1	8	0	3	11	0	5
NITRITE	8	7	1	8	0	7	11	2	8
TOTAL NITRATES	8	8	0	8	8	0	11	11	0
NITROGEN TOT KJELD	8	8	0	8	7	1	11	10	1
PH	8	8	0	8	8	0	11	11	0
PHOSPHORUS FIL REACT	8	7	1	8	0	5	.	.	.
PHOSPHORUS TOTAL	8	8	0	8	0	4	.	.	.
SULPHATE	8	8	0	8	8	0	11	11	0
TURBIDITY	8	8	0	8	7	1	11	6	5
*TOTAL SCAN CHEMISTRY (LAB)	176	159	5	175	125	28	208	171	29

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS									
SILVER	8	0	0	8	0	0	10	0	0
ALUMINUM	8	8	0	8	8	0	10	10	0
ARSENIC	8	0	8	8	0	8	10	0	10
BARIUM	8	8	0	8	8	0	10	10	0
BORON	8	7	1	8	6	2	10	8	2
BERYLLIUM	8	0	2	8	0	0	10	0	2
CADMIUM	8	0	3	8	0	1	10	0	3
COBALT	8	0	8	8	0	6	10	0	8
CHROMIUM	8	0	7	8	0	7	10	0	9
COPPER	8	0	8	8	0	6	10	3	7
IRON	8	7	1	8	0	1	10	0	2
MERCURY	8	0	0	8	1	0	.	.	.
MANGANESE	8	8	0	8	8	0	10	9	1
MOLYBDENUM	8	4	4	8	8	0	10	10	0
NICKEL	8	2	5	8	0	5	10	1	6
LEAD	8	5	3	8	0	2	10	3	7
ANTIMONY	8	0	8	8	1	7	10	4	6
SELENIUM	8	0	2	8	0	5	10	0	7
STRONTIUM	8	8	0	8	8	0	10	10	0
TITANIUM	8	7	1	8	2	6	10	3	7
THALLIUM	8	0	0	8	0	0	10	0	0
URANIUM	8	5	3	8	0	6	10	0	9
VANADIUM	8	7	1	8	0	8	10	2	8
ZINC	8	8	0	8	1	7	10	6	4
*TOTAL SCAN METALS	192	84	65	192	51	77	230	79	98
*TOTAL GROUP INORGANIC & PHYSICAL	392	267	70	415	224	105	501	313	127
CHLOROAROMATICS									
HEXACHLOROBUTADIENE	8	0	0	8	0	0	5	0	0
123 TRICHLOROBENZENE	8	0	0	8	0	0	5	0	0
1234 T-CHLOROBENZENE	8	0	0	8	0	0	5	0	0
1235 T-CHLOROBENZENE	8	0	0	8	0	0	5	0	0
124 TRICHLOROBENZENE	8	0	0	8	0	0	5	0	0
1245 T-CHLOROBENZENE	8	0	0	8	0	0	5	0	0
135 TRICHLOROBENZENE	8	0	0	8	0	0	5	0	0
HCB	8	0	0	8	0	0	5	0	0
HEXACHLOROETHANE	8	0	0	8	0	1	5	0	1
OCTACHLOROSTYRENE	8	0	0	8	0	0	5	0	0
PENTACHLOROBENZENE	8	0	0	8	0	0	5	0	0
236 TRICHLOROTOLUENE	8	0	0	8	0	0	5	0	0
245 TRICHLOROTOLUENE	8	0	0	8	0	0	5	0	0
26A TRICHLOROTOLUENE	8	0	0	8	0	0	5	0	0
*TOTAL SCAN CHLOROAROMATICS	112	0	0	112	0	1	70	0	1

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS									
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0
PAH									
PHENANTHRENE	7	0	0	7	0	0	.	.	.
ANTHRACENE	7	0	0	7	0	0	.	.	.
FLUORANTHENE	7	0	0	7	0	0	.	.	.
PYRENE	7	0	0	7	0	0	.	.	.
BENZO(A)ANTHRACENE	7	0	0	7	0	0	.	.	.
CHRYSENE	7	0	0	7	0	0	.	.	.
DIMETH. BENZ(A)ANTHR	7	0	0	7	0	0	.	.	.
BENZO(E) PYRENE	7	0	0	7	0	0	.	.	.
BENZO(B) FLUORANTHEN	7	0	0	7	0	0	.	.	.
PERYLENE	7	0	0	7	0	0	.	.	.
BENZO(K) FLUORANTHEN	7	0	0	7	0	0	.	.	.
BENZO(A) PYRENE	7	0	0	7	0	0	.	.	.
BENZO(G,H,I) PERYLEN	7	0	0	7	0	0	.	.	.
DIBENZO(A,H) ANTHRAC	7	0	0	7	0	0	.	.	.
INDENO(1,2,3-C,D) PY	7	0	0	7	0	0	.	.	.
BENZO(B) CHRYSENE	7	0	0	7	0	0	.	.	.
CORONENE	7	0	0	7	0	0	.	.	.
*TOTAL SCAN PAH	119	0	0	119	0	0	0	0	0
PESTICIDES & PCB									
ALDRIN	8	0	0	8	0	0	5	0	0
ALPHA BHC	8	0	5	8	0	4	5	0	3
BETA BHC	8	0	0	8	0	0	5	0	0
LINDANE	8	0	1	8	0	0	5	0	0
ALPHA CHLORDANE	8	0	0	8	0	0	5	0	0
GAMMA CHLORDANE	8	0	0	8	0	0	5	0	0
DIELDRIN	8	0	0	8	0	0	5	0	0
METHOXYCHLOR	8	0	0	8	0	0	5	0	0
ENDOSULFAN 1	8	0	0	8	0	0	5	0	0
ENDOSULFAN II	8	0	0	8	0	0	5	0	0
ENDRIN	8	0	0	8	0	0	5	0	0
ENDOSULFAN SULPHATE	8	0	0	8	0	0	5	0	0
HEPTACHLOR EPOXIDE	8	0	0	8	0	0	5	0	0
HEPTACHLOR	8	0	0	8	0	0	5	0	0
MIREX	8	0	0	8	0	0	5	0	0
OXYCHLORDANE	8	0	0	8	0	0	5	0	0
OPDDT	8	0	0	8	0	0	5	0	0
PCB	8	0	0	8	0	0	5	0	0
DDD	8	0	0	8	0	0	5	0	0
PPDDE	8	0	0	8	0	0	5	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	8	0	0	8	0	0	5	0	0
AMETRINE	8	0	0	8	0	0	.	.	.
ATRAZINE	8	2	5	8	2	3	.	.	.
ATRATONE	8	0	0	8	0	0	.	.	.
CYANAZINE (BLADEX)	8	0	0	8	0	0	.	.	.
DESETHYLATRAZINE	8	0	1	8	0	1	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.
PROMETONE	8	0	0	8	0	0	.	.	.
PROPAZINE	8	0	0	8	0	0	.	.	.
PROMETRYNE	8	0	0	8	0	0	.	.	.
METRIBUZIN (SENCOR)	8	0	0	8	0	0	.	.	.
SIMAZINE	8	0	0	8	0	0	.	.	.
ALACHLOR (LASSO)	8	0	0	8	0	0	.	.	.
METOLACHLOR	8	0	2	8	0	1	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	0	1	1	0	1
*TOTAL SCAN PESTICIDES & PCB	273	2	14	273	2	10	106	0	4
PHENOLICS									
PHENOLICS	8	0	4	8	1	2	.	.	.
*TOTAL SCAN PHENOLICS	8	0	4	8	1	2	0	0	0
SPECIFIC PESTICIDES									
TOXAPHENE	8	0	0	8	0	0	5	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.
ETHION	2	0	0	2	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.
CICP	2	0	0	2	0	0	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.
IPC	2	0	0	2	0	0	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	60	0	0	60	0	0	5	0	0
VOLATILES									
BENZENE	8	0	0	8	0	2	6	0	1
TOLUENE	8	0	0	8	0	4	6	0	4
ETHYLBENZENE	8	0	0	8	0	5	6	0	4
P-XYLENE	8	0	0	8	0	0	6	0	0
M-XYLENE	8	0	0	8	0	4	6	0	2
O-XYLENE	8	0	0	8	0	2	6	0	2
STYRENE	8	0	0	8	0	1	6	0	2
1,1 DICHLOROETHYLENE	8	0	0	8	0	0	6	0	0
METHYLENE CHLORIDE	8	0	0	8	0	0	6	0	0
T1,2DICHLOROETHYLENE	8	0	0	8	0	0	6	0	0
1,1 DICHLOROETHANE	8	0	0	8	0	0	6	0	0
CHLOROFORM	8	0	1	8	8	0	6	6	0
111, TRICHLOROETHANE	8	0	0	8	0	4	6	0	2
1,2 DICHLOROETHANE	8	0	0	8	0	0	6	0	0
CARBON TETRACHLORIDE	8	0	0	8	0	0	6	0	0
1,2 DICHLOROPROPANE	8	0	0	8	0	0	6	0	0
TRICHLOROETHYLENE	8	0	0	8	0	0	6	0	0
DICHLOROBROMOMETHANE	8	0	1	8	8	0	6	6	0
112 TRICHLOROETHANE	8	0	0	8	0	0	6	0	0
CHLORODIBROMOMETHANE	8	0	0	8	8	0	6	6	0
T-CHLOROETHYLENE	8	0	0	8	0	5	6	0	5
BROMOFORM	8	0	0	8	0	7	6	0	6
1122 T-CHLOROETHANE	8	0	0	8	0	0	6	0	0
CHLOROBENZENE	8	0	0	8	0	0	6	0	0
1,4 DICHLOROBENZENE	8	0	0	8	0	0	6	0	0
1,3 DICHLOROBENZENE	8	0	0	8	0	0	6	0	0
1,2 DICHLOROBENZENE	8	0	0	8	0	0	6	0	0
ETHLYENE DIBROMIDE	8	0	0	8	0	0	6	0	0
TOTL TRIHALOMETHANES	8	0	0	8	8	0	6	6	0
*TOTAL SCAN VOLATILES	232	0	2	232	32	34	174	24	28
*TOTAL GROUP ORGANIC	816	2	20	816	35	47	355	24	33

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)
MAY	8	.	.	.
JUN	8	.	.	.
JUL	2	.	.	.
AUG	6	.	.	.
SEP	208	.	.	.
OCT	84	.	.	.
NOV	BDL	.	.	.
DEC	BDL	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)
MAY	.	0 <=>	.	0 <=>
JUN	.	12	.	1 <=>
JUL	.	0 <=>	.	0 <=>
AUG	.	1 <=>	.	.
SEP	.	1 <=>	.	2 <=>
OCT	.	3 <=>	.	.
NOV	.	8 <=>	.	2 <=>
DEC	.	3 <=>	.	0 <=>
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)
MAY	300 <=>	.	.	.
JUN	200 <=>	.	.	.
JUL	20 <=>	.	.	.
AUG	100	.	.	.
SEP	4000	.	.	.
OCT	1200	.	.	.
NOV	200	.	.	.
DEC	17 <=>	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A
MAY	7700	.	.	.
JUN	30100	.	.	.
JUL	6400	.	.	.
AUG	11000	.	.	.
SEP	30000	.	.	.
OCT	40000	.	.	.
NOV	11600	.	.	.
DEC	3317	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.200	.	.400
JUN	.	.160	.400	.150
JUL	.	.320	.400	.300
AUG	.	.160	.	.
SEP	.	.230	.800	.300
OCT	.	.250	.	.
NOV	.	.140	.800	.600
DEC	.	.160	.100	.100
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.850	.	.600
JUN	.	.550	.300	.700
JUL	.	.910	.700	.900
AUG	.	.980	.	.
SEP	.	.740	.100	.850
OCT	.	.810	.	.
NOV	.	.600	.100	.500
DEC	.	.850	.500	.800
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	1.050	.	1.000
JUN	.	.710	.700	.850
JUL	.	1.230	1.100	1.200
AUG	.	1.140	.	.
SEP	.	.970	.900	1.150
OCT	.	1.060	.	.
NOV	.	.740	.900	1.100
DEC	.	1.010	.600	.900
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
MAY	7.800	7.300	.	7.500
JUN	7.900	7.200	7.400	7.600
JUL	7.900	7.200	7.600	7.500
AUG	8.300	7.200	.	.
SEP	8.000	7.300	7.500	7.500
OCT	8.000	7.200	.	.
NOV	8.000	7.400	7.600	7.600
DEC	8.200	7.400	7.400	7.600
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
MAY	14.000	15.500	.	12.500
JUN	22.000	23.000	19.500	19.000
JUL	20.000	21.000	20.500	19.000
AUG	21.000	23.000	.	.
SEP	18.000	19.000	19.000	17.500
OCT	13.000	14.000	.	.
NOV	6.000	9.000	16.000	8.000
DEC	3.000	5.000	9.000	7.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)
MAY	55.600	.050	.	.
JUN	57.290	.040	.050	.050
JUL	7.750	.100	.070	.070
AUG	35.560	.090	.	.
SEP	64.890	.090	.040	.050
OCT	36.440	.080	.	.
NOV	10.600	.090	.	.050
DEC	12.800	.040	.	.040

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)
MAY	88.400	80.300	.	80.100
JUN	87.600	79.100	79.900	80.300
JUL	120.200	115.000	111.700	110.900
AUG	81.100	76.400	.	.
SEP	94.400	91.300	89.900	87.500
OCT	113.400	95.700	.	.
NOV	127.300	117.100	117.700	116.000
DEC	116.200	110.900	108.900	108.500
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
MAY	34.000	37.600	.	36.600
JUN	31.000	30.800	30.800	30.800
JUL	50.100	51.500	50.200	50.400
AUG	27.400	29.800	.	.
SEP	37.000	41.000	40.600	39.000
OCT	45.400	43.700	.	.
NOV	51.400	49.000	50.600	49.000
DEC	43.800	45.200	44.000	43.200
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
MAY	11.200	14.700	.	15.300
JUN	9.500	11.800	11.200	11.100
JUL	33.200	39.900	38.900	38.100
AUG	11.300	13.100	.	.
SEP	17.800	22.400	22.200	20.700
OCT	17.700	20.200	.	.
NOV	15.800	17.400	17.900	18.100
DEC	13.200	17.300	16.100	16.200
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
MAY	5.000	1.000 <T	.	1.000 <T
JUN	1.000 <T	BDL	.500 <T	.500 <T
JUL	6.000	1.000 <T	1.000 <T	1.000 <T
AUG	1.500 <T	.500 <T	.	.
SEP	20.000	1.500 <T	1.500 <T	1.500 <T
OCT	27.000	1.000 <T	.	.
NOV	8.500	.500 <T	BDL	.500 <T
DEC	5.000	.500 <T	.500 <T	.500 <T
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)
MAY	261	287	.	287
JUN	237	247	243	243
JUL	432	462	449	444
AUG	236	244	.	.
SEP	296	330	326	314
OCT	344	342	.	.
NOV	360	359	364	359
DEC	322	348	336	335

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
DISS ORG CARBON (MG/L)			**DET'N LIMIT = .100**	**GUIDELINE = 5.0 (A3)**
MAY	2.300	1.800	.	1.800
JUN	1.800	1.300	1.200	1.200
JUL	3.100	2.400	2.400	2.100
AUG	2.000	1.200	.	.
SEP	3.800	1.700	1.700	1.900
OCT	1.600	2.000	.	.
NOV	2.900	2.000	2.000	1.900
DEC	2.400	1.900	1.800	1.800
FLUORIDE (MG/L)			**DET'N LIMIT = 0.01**	**GUIDELINE = 2.4 (A1)**
MAY	.100	.120	.	.100
JUN	.080	.080	.100	.100
JUL	.180	.180	.180	.180
AUG	.100	.100	.	.
SEP	.120	.100	.120	.100
OCT	.120	.100	.	.
NOV	.120	.100	.100	.100
DEC	.100	.100	.100	.100
HARDNESS (MG/L)			**DET'N LIMIT = 0.5**	**GUIDELINE = 80-100 (A4)**
MAY	119.000	131.000	.	128.000
JUN	110.000	110.000	109.000	110.000
JUL	182.500	189.600	182.600	182.200
AUG	103.000	108.000	.	.
SEP	131.000	143.000	142.000	136.000
OCT	157.000	151.000	.	.
NOV	174.200	167.000	171.500	167.200
DEC	151.000	157.000	152.000	150.000
IONCAL (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
MAY	.869	3.507	.	1.222
JUN	.775	1.329	.233	.246
JUL	3.353	1.606	1.370	1.706
AUG	1.485	1.007	.	.
SEP	.594	.121	.688	.292
OCT	1.592	1.030	.	.
NOV	3.894	1.318	3.148	1.404
DEC	.855	2.241	2.116	4.041
LANGELIERS INDEX (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
MAY	.184	-.124	.	-.137
JUN	.309	.168	.114	.097
JUL	.666	.565	.543	.532
AUG	.193	.180	.	.
SEP	.266	.249	.198	.210
OCT	.506	.316	.	.
NOV	.819	.682	.707	.678
DEC	.523	.324	.306	.266

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MAGNESIUM (MG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = 30 (F2)**
MAY	8.400	8.900	.	9.000
JUN	8.000	8.100	7.900	7.900
JUL	13.950	14.800	13.900	13.700
AUG	8.300	8.300	.	.
SEP	9.400	9.900	9.800	9.500
OCT	10.500	10.200	.	.
NOV	11.150	10.850	11.000	10.900
DEC	10.100	10.700	10.200	10.100
SODIUM (MG/L)			**DET'N LIMIT = 0.2**	**GUIDELINE = 200 (A4)**
MAY	5.800	6.400	.	6.200
JUN	5.200	5.100	5.200	5.200
JUL	18.600	19.500	19.600	18.700
AUG	6.400	6.200	.	.
SEP	8.200	9.800	9.800	9.000
OCT	9.000	8.900	.	.
NOV	7.500	7.500	7.800	7.600
DEC	6.400	6.800	6.400	6.200
AMMONIUM TOTAL (MG/L)			**DET'N LIMIT = 0.002**	**GUIDELINE = 0.05 (F2)**
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	BDL	BDL
JUL	.048	.002 <T	.006 <T	.004 <T
AUG	.018	BDL	.	.
SEP	.020	BDL	.006 <T	BDL
OCT	BDL	BDL	.	.
NOV	BDL	.006 <T	.004 <T	.006 <T
DEC	.006 <T	.002 <T	BDL	BDL
NITRITE (MG/L)			**DET'N LIMIT = 0.001**	**GUIDELINE = 1 (A1)**
MAY	.026	.001 <T	.	BDL
JUN	.004 <T	.001 <T	.006	.005
JUL	.040	.002 <T	.004 <T	.004 <T
AUG	.007	BDL	.	.
SEP	.033	.003 <T	.004 <T	.004 <T
OCT	.019	.001 <T	.	.
NOV	.015	.004 <T	.002 <T	.002 <T
DEC	.013	.001 <T	.001 <T	.001 <T
TOTAL NITRATES (MG/L)			**DET'N LIMIT = 0.005**	**GUIDELINE = 10 (A1)**
MAY	1.380	2.070	.	2.030
JUN	.415	.410	.400	.400
JUL	2.160	2.350	2.230	2.180
AUG	.235	.290	.	.
SEP	1.410	1.350	1.370	1.360
OCT	1.640	1.570	.	.
NOV	2.200	2.070	2.130	2.050
DEC	1.690	1.740	1.680	1.670

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = N/A**
MAY	.370	.200	.	.270
JUN	.550	.150	.160	.150
JUL	.590	.310	.320	.400
AUG	.280	.080 <T	.	.
SEP	.770	.230	.210	.210
OCT	.660	.240	.	.
NOV	.380	.170	.080 <T	.160
DEC	.340	.190	.160	.170
PH (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = 6.5-8.5(A4)**
MAY	8.130	7.830	.	7.830
JUN	8.290	8.200	8.140	8.120
JUL	8.340	8.250	8.250	8.240
AUG	8.260	8.240	.	.
SEP	8.160	8.120	8.080	8.120
OCT	8.240	8.140	.	.
NOV	8.450	8.370	8.380	8.370
DEC	8.260	8.070	8.070	8.040
PHOSPHORUS FIL REACT (MG/L)			**DET'N LIMIT = 0.0005**	**GUIDELINE = N/A**
MAY	.006	.001 <T	.	.
JUN	.022	.002 <T	.	.
JUL	.000 <T	.000 <T	.	.
AUG	.003	BDL	.	.
SEP	.011	BDL	.	.
OCT	.013	.000 <T	.	.
NOV	.009	.000 <T	.	.
DEC	.003	BDL	.	.
PHOSPHORUS TOTAL (MG/L)			**DET'N LIMIT = 0.002**	**GUIDELINE = .40 (F2)**
MAY	.038	BDL	.	.
JUN	.115	BDL	.	.
JUL	.020	.002 <T	.	.
AUG	.030	BDL	.	.
SEP	.087	.002 <T	.	.
OCT	.068	.002 <T	.	.
NOV	.031	BDL	.	.
DEC	.025	.002 <T	.	.
SULPHATE (MG/L)			**DET'N LIMIT = .200**	**GUIDELINE = 500 (A3)**
MAY	20.900	29.850	.	30.000
JUN	17.420	24.650	22.880	22.650
JUL	39.430	46.580	45.660	44.820
AUG	19.530	23.860	.	.
SEP	24.260	35.010	34.350	33.510
OCT	27.940	37.310	.	.
NOV	24.810	30.550	30.900	30.980
DEC	24.350	32.630	30.360	30.870

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)
MAY	26.000	.240	.	.150
JUN	87.000	.190	.190 <T	.110 <T
JUL	4.800	.260	.170 <T	.210 <T
AUG	25.000	.450	.	.
SEP	67.000	.230 <T	.400	.170 <T
OCT	32.000	.280	.	.
NOV	14.000	.750	.360	.450
DEC	12.300	.390	.410	.410

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METALS				
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
MAY	210.000	60.000	.	49.000
JUN	480.000	130.000	180.000	.
JUL	72.000	160.000	150.000	180.000
AUG	150.000	230.000	.	.
SEP	470.000	96.000	91.000	83.000
OCT	360.000	47.000	.	.
NOV	130.000	53.000	53.000	52.000
DEC	130.000	46.000	41.000	41.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
MAY	.640 <T	.300 <T	.	.230 <T
JUN	1.000 <T	.260 <T	.130 <T	.
JUL	.570 <T	.400 <T	.350 <T	.370 <T
AUG	.890 <T	.350 <T	.	.
SEP	.820 <T	.350 <T	.440 <T	.240 <T
OCT	1.000 <T	.260 <T	.	.
NOV	.960 <T	.390 <T	.640 <T	.440 <T
DEC	.580 <T	.280 <T	.330 <T	.190 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
MAY	18.000	16.000	.	16.000
JUN	24.000	16.000	16.000	.
JUL	29.000	31.000	30.000	30.000
AUG	18.000	17.000	.	.
SEP	30.000	27.000	27.000	26.000
OCT	25.000	20.000	.	.
NOV	22.000	19.000	19.000	19.000
DEC	19.000	18.000	17.000	17.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
MAY	36.000	45.000	.	46.000
JUN	22.000	20.000 <T	20.000 <T	.
JUL	47.000	51.000	53.000	52.000
AUG	26.000	26.000	.	.
SEP	42.000	43.000	46.000	45.000
OCT	32.000	28.000	.	.
NOV	23.000	20.000 <T	23.000	23.000
DEC	19.000 <T	25.000	23.000	17.000 <T
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)
MAY	BDL	BDL	.	.070 <T
JUN	.090 <T	BDL	BDL	.
JUL	BDL	BDL	.070 <T	BDL
AUG	BDL	BDL	.	.
SEP	.080 <T	BDL	BDL	BDL
OCT	BDL	BDL	.	.
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.070 <T	.
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	.	.
SEP	.090 <T	BDL	BDL	BDL
OCT	.120 <T	BDL	.	.
NOV	.060 <T	.080 <T	.060 <T	.090 <T
DEC	BDL	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A
MAY	.200 <T	.050 <T	.	.050 <T
JUN	.640 <T	BDL	.050 <T	.
JUL	.170 <T	.070 <T	.120 <T	.100 <T
AUG	.270 <T	.060 <T	.	.
SEP	.630 <T	.330 <T	.290 <T	.250 <T
OCT	.460 <T	.180 <T	.	.
NOV	.120 <T	BDL	BDL	BDL
DEC	.160 <T	.050 <T	.040 <T	.050 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
MAY	1.700 <T	2.100 <T	.	2.100 <T
JUN	2.500 <T	1.300 <T	1.200 <T	.
JUL	2.400 <T	2.700 <T	3.000 <T	2.800 <T
AUG	1.400 <T	.910 <T	.	.
SEP	3.200 <T	2.100 <T	2.900 <T	2.600 <T
OCT	1.600 <T	BDL	.	.
NOV	1.200 <T	.520 <T	1.100 <T	1.100 <T
DEC	BDL	1.800 <T	1.800 <T	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)
MAY	1.700 <T	.780 <T	.	4.800 <T
JUN	2.700 <T	BDL	10.000	.
JUL	1.700 <T	.960 <T	8.500	2.900 <T
AUG	1.400 <T	BDL	.	.
SEP	3.000 <T	.600 <T	3.200 <T	2.200 <T
OCT	3.100 <T	.780 <T	.	.
NOV	2.000 <T	1.200 <T	6.100	2.800 <T
DEC	1.700 <T	.690 <T	2.900 <T	2.100 <T
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
MAY	200.000	BDL	.	26.000 <T
JUN	850.000	BDL	BDL	.
JUL	110.000	BDL	BDL	BDL
AUG	270.000	BDL	.	.
SEP	7.000 <T	51.000 <T	21.000 <T	BDL
OCT	490.000	BDL	.	.
NOV	200.000	BDL	BDL	BDL
DEC	200.000	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	.130	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)
MAY	8.400	1.200	.	1.300
JUN	41.000	1.800	.930	.
JUL	6.100	1.100	.660	.950
AUG	19.000	.900	.	.
SEP	22.000	1.300	1.100	1.200
OCT	15.000	.930	.	.
NOV	6.500	.600	.410 <T	.640
DEC	4.900	.800	.630	.620
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
MAY	.390 <T	1.200	.	1.100
JUN	.130 <T	.650	.690	.
JUL	2.000	2.200	2.100	2.200
AUG	.500 <T	.900	.	.
SEP	.490 <T	1.800	2.000	1.800
OCT	.620	1.300	.	.
NOV	.630	.900	.930	.950
DEC	.630	1.000	.920	.930
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)
MAY	1.200 <T	.810 <T	.	1.300 <T
JUN	1.300 <T	BDL	BDL	.
JUL	1.000 <T	.220 <T	.500 <T	.400 <T
AUG	.920 <T	.350 <T	.	.
SEP	2.800	1.800 <T	2.400	2.000 <T
OCT	2.100	.660 <T	.	.
NOV	BDL	BDL	BDL	BDL
DEC	.760 <T	BDL	.690 <T	.830 <T
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)
MAY	.680	BDL	.	1.000
JUN	2.500	BDL	5.900	.
JUL	.240 <T	BDL	1.400	.500 <T
AUG	.570	BDL	.	.
SEP	1.600	.060 <T	.500 <T	.320 <T
OCT	.950	BDL	.	.
NOV	.430 <T	.090 <T	.490 <T	.320 <T
DEC	.290 <T	BDL	.230 <T	.100 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)
MAY	.270 <T	.300 <T	.	.370 <T
JUN	.210 <T	.440 <T	.450 <T	.
JUL	.400 <T	.460 <T	.540	.560
AUG	.360 <T	.450 <T	.	.
SEP	.310 <T	.590	.480 <T	.530
OCT	.270 <T	.480 <T	.	.
NOV	.310 <T	.430 <T	.470 <T	.430 <T
DEC	.360 <T	.500 <T	.430 <T	.510
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)
MAY	BDL	1.400 <T	.	1.400 <T
JUN	1.400 <T	1.600 <T	1.800 <T	.
JUL	BDL	3.100 <T	2.700 <T	2.700 <T
AUG	BDL	BDL	.	.
SEP	BDL	2.000 <T	2.100 <T	1.600 <T
OCT	BDL	BDL	.	.
NOV	BDL	BDL	1.600 <T	BDL
DEC	1.400 <T	1.600 <T	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A
MAY	130.000	130.000	.	130.000
JUN	120.000	110.000	110.000	.
JUL	350.000	370.000	370.000	350.000
AUG	130.000	130.000	.	.
SEP	210.000	230.000	230.000	210.000
OCT	200.000	180.000	.	.
NOV	170.000	160.000	160.000	160.000
DEC	160.000	170.000	160.000	170.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A
MAY	6.900	5.800	.	5.700
JUN	8.700	4.200 <T	4.700 <T	.
JUL	5.200	4.100 <T	3.500 <T	3.600 <T
AUG	4.400 <T	3.100 <T	.	.
SEP	10.000	5.600	5.400	6.000
OCT	5.400	2.800 <T	.	.
NOV	6.300	3.500 <T	3.500 <T	3.600 <T
DEC	5.200	4.000 <T	3.600 <T	3.400 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)
MAY	.460 <T	.120 <T	.	.080 <T
JUN	.290 <T	BDL	BDL	.
JUL	.750	.240 <T	.220 <T	.250 <T
AUG	.300 <T	BDL	.	.
SEP	.650	.120 <T	.110 <T	.080 <T
OCT	.750	.110 <T	.	.
NOV	.620	.140 <T	.150 <T	.160 <T
DEC	.650	.180 <T	.150 <T	.160 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
MAY	.670	.460 <T	.	.380 <T
JUN	1.600	.370 <T	.450 <T	.
JUL	.650	.480 <T	.480 <T	.500 <T
AUG	.870	.350 <T	.	.
SEP	1.600	.480 <T	.510	.530
OCT	1.200	.200 <T	.	.
NOV	.570	.200 <T	.190 <T	.190 <T
DEC	.500 <T	.200 <T	.170 <T	.200 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
MAY	3.200	1.000 <T	.	1.500 <T
JUN	10.000	1.500 <T	22.000	.
JUL	2.400	1.500 <T	3.400	2.000 <T
AUG	2.900	1.000 <T	.	.
SEP	7.100	1.600 <T	2.200	1.500 <T
OCT	6.700	1.800 <T	.	.
NOV	4.500	3.000	4.400	3.600
DEC	2.300	1.200 <T	2.200	1.300 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
CHLOROAROMATICS					
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)
MAY	BDL	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	
JUL	BDL	BDL	.	BDL	
AUG	BDL	BDL	.	.	
SEP	BDL	BDL	.	BDL	
OCT	BDL	BDL	.	.	
NOV	BDL	BDL	.	2.000 <T	
DEC	BDL	2.000 <T	.	!PE	
HEXACHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = N/A
OCT	BDL	BDL	.	.	
NOV	BDL	30.000 <T	.	35.000 <T	
DEC	BDL	BDL	.	!PE	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PESTICIDES & PCB				
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
MAY	2.000 <T	1.000 <T	.	BDL
JUN	1.000 <T	1.000 <T	.	1.000 <T
JUL	1.000 <T	1.000 <T	.	1.000 <T
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	.
NOV	1.000 <T	1.000 <T	.	2.000 <T
DEC	1.000 <T	BDL	.	!PE
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	2.000 <T	BDL	.	BDL
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	!PE
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
MAY	750.000	1600.000	.	.
JUN	BDL	BDL	.	.
JUL	500.000 <T	550.000	.	.
AUG	150.000 <T	BDL	.	.
SEP	530.000	80.000 <T	.	.
OCT	370.000 <T	BDL	.	.
NOV	310.000 <T	270.000 <T	.	.
DEC	250.000 <T	320.000 <T	.	.
DESETHYLATRAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	230.000 <T	220.000 <T	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.
METOLACHLOR (NG/L)			DET'N LIMIT = 500.	GUIDELINE = 50000 (A2)
MAY	900.000 <T	2000.000 <T	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	570.000 <T	BDL	.	.
NOV	BDL	BDL	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
PHENOLICS (UG/L)	PHENOLICS		DET'N LIMIT = .200	GUIDELINE = 2	(A4)
MAY	BDL	BDL	.	.	
JUN	BDL	BDL	.	.	
JUL	BDL	BDL	.	.	
AUG	.400 <T	.600 <T	.	.	
SEP	BDL	BDL	.	.	
OCT	.600 <T	BDL	.	.	
NOV	.800 <T	.800 <T	.	.	
DEC	.600 <T	1.600	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VOLATILES				
BENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)
MAY	BDL	BDL	.	BDL
JUN	BDL	.050 <T	.	BDL
JUL	BDL	.100 <T	.	.050 <T
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
TOLUENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)
MAY	BDL	.050 <T	.	.050 <T
JUN	BDL	.150 <T	.	.100 <T
JUL	BDL	.200 <T	.	.100 <T
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.050 <T
DEC	BDL	.050 <T	.	BDL
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)
MAY	BDL	BDL	.	BDL
JUN	BDL	.050 <T	.	.100 <T
JUL	BDL	.100 <T	.	.050 <T
AUG	BDL	.100 <T	.	.
SEP	BDL	BDL	.	.100 <T
OCT	BDL	.100 <T	.	.
NOV	BDL	BDL	.	.050 <T
DEC	BDL	.100 <T	.	BDL
M-XYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)
MAY	BDL	BDL	.	BDL
JUN	BDL	.100 <T	.	.100 <T
JUL	BDL	.200 <T	.	.100 <T
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	.300 <T	.	.
NOV	BDL	.100 <T	.	BDL
DEC	BDL	BDL	.	BDL
O-XYLENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 300 (A3*)
MAY	BDL	BDL	.	BDL
JUN	BDL	.050 <T	.	.050 <T
JUL	BDL	BDL	.	.050 <T
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	.100 <T	.	.
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
STYRENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 100 (D1)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	.100 <T	.	BDL
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.100 <T
OCT	BDL	BDL	.	.
NOV	BDL	BDL	.	.050 <T
DEC	BDL	BDL	.	BDL
CHLOROFORM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)
MAY	BDL	29.200	.	29.900
JUN	BDL	26.100	.	23.900
JUL	.100 <T	39.400	.	45.100
AUG	BDL	21.200	.	.
SEP	BDL	29.800	.	31.900
OCT	BDL	34.500	.	.
NOV	BDL	23.900	.	28.300
DEC	BDL	24.500	.	25.600
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)
MAY	BDL	BDL	.	BDL
JUN	BDL	.040 <T	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	BDL
OCT	BDL	.040 <T	.	.
NOV	BDL	.040 <T	.	.040 <T
DEC	BDL	.040 <T	.	.040 <T
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)
MAY	BDL	13.950	.	13.750
JUN	BDL	10.250	.	9.650
JUL	.050 <T	20.700	.	21.950
AUG	BDL	12.150	.	.
SEP	BDL	16.050	.	16.400
OCT	BDL	12.200	.	.
NOV	BDL	10.950	.	12.650
DEC	BDL	11.500	.	11.650
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)
MAY	BDL	4.200	.	4.100
JUN	BDL	3.300	.	3.600
JUL	BDL	7.500	.	7.900
AUG	BDL	5.600	.	.
SEP	BDL	5.700	.	5.300
OCT	BDL	2.700	.	.
NOV	BDL	3.400	.	3.700
DEC	BDL	3.200	.	3.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM BELLE RIVER WTP 1990

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)
MAY	BDL	.150 <T	.	.150 <T	
JUN	BDL	.150 <T	.	.100 <T	
JUL	BDL	.150 <T	.	.150 <T	
AUG	BDL	.100 <T	.	.	
SEP	BDL	.100 <T	.	.100 <T	
OCT	BDL	BDL	.	.	
NOV	BDL	BDL	.	.050 <T	
DEC	BDL	BDL	.	BDL	
BROMOFORM (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)
MAY	BDL	.400 <T	.	.400 <T	
JUN	BDL	.400 <T	.	.400 <T	
JUL	BDL	.600 <T	.	.600 <T	
AUG	BDL	.800 <T	.	.	
SEP	BDL	.600 <T	.	.600 <T	
OCT	BDL	BDL	.	.	
NOV	BDL	.200 <T	.	.400 <T	
DEC	BDL	.200 <T	.	.200 <T	
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)
MAY	BDL	47.750	.	48.150	
JUN	BDL	40.050	.	37.600	
JUL	BDL	68.200	.	75.550	
AUG	BDL	39.800	.	.	
SEP	BDL	52.200	.	54.050	
OCT	BDL	49.350	.	.	
NOV	BDL	38.550	.	45.000	
DEC	BDL	39.450	.	40.550	

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS
Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS
Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME
Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION
This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM
Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as

possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: **NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD P0C0D0) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT,

DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45);
MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE
CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics	-1 L amber glass bottle per scan

(OWOC) (OAPAHX)

-do not rinse bottle
-fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.